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IOT based Air and Sound Pollution Monitoring System

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Abstract- **The pollution of air and sound is increasing abruptly. To bring it under control its monitoring is majorly recommended. To overcome this issue, we are introducing a system through which the level of sound and the existence of the harmful gases in the surroundings can be detected. The growing pollution at such an alarming rate has started creating trouble for the living beings, may it be high decibels or toxic gases present in the environment leaves a harmful effect on human's health and thus needs a special attention.**

Keywords- **Sound level, Gases, IOT, Pollution, Sensor etc.**

I. INTRODUCTION

Network Devices and the Internet of Things All kinds of ordinary household gadgets can microphones and other instrumentation can be embedded in these devices to enable them for work in the Internet of Things. Home automation systems already implement primitive versions of this concept for things like light bulbs, plus other devices like wireless scales and wireless blood pressure monitors that each represent early examples of IoT gadgets.Some of the more practical and realistic sounding possibilities for the technology include: Receiving warnings on your phone or wearable device when IoT networks detect some physical danger is detected nearby Self-parking automobiles. Automatic ordering of groceries and other home. Automatic tracking of exercise habits and other day-to-day personal activity including goal tracking and regular progress reports.

II. OBJECTIVE

The main objective of IOT Air & Sound Monitoring System is that the Air and sound pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in an area through IOT. System uses air sensor presence of harmful gases/compounds in the air and constantly transmit this data.

Also, system keeps measuring sound level and reports it. The sensors interact with raspberry pi which processes this data and transmits it over the application. This allows authorities to monitor air pollution in different areas and act against it. Also, authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to controlthe issue. Some future consumer applications envisioned for IoT sound like science fiction.

III. LITERATURE REVIEW

The goal of building a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. Information and Communication Technology allows city officials to interact directly with the public to tell what is happening in the city, how the city is evolving, and how to enable a better quality of life. A Smart City is one with at least one initiative addressing one or more of the following six characteristics: Smart Governance, Smart People, Smart Living, Smart Mobility, Smart Economy and Smart Environment. In this system, an application was developed that is going to bear a hand in this campaign. An area that is being surveyed for estimating how much the area is affected by pollution. The constituents of air along with its proportion are calculated and if it is higher than normal then the officials are intimated about it. Then the people are evacuated to a safe place.

The description about the integrated network architecture and the interconnecting mechanisms for the reliable measurement of parameters by smart sensors and transmission of data via internet is being presented. The longitudinal learning system could provide a self-control mechanism for better operation of the devices in monitoring stage. The framework of the monitoring system was based on a combination of pervasive distributed sensing units, information system for data aggregation, and reasoning and context awareness.

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Results are encouraging as the reliability of sensing information transmission through the proposed integrated network architecture is 97%. The prototype was tested to generate real-time graphical information rather than a test bed scenario.

In this research, a real time monitoring of three gases are simulated in real environment. Gases that are monitored in this implementation are Carbon monoxide, carbon dioxide & Sulphur dioxide. In this simulation, these three gases are successfully tested in four areas. Then extended the simulated results to update in web. As the technology increase, the degree of automation (minimizing the man power) in the almost all sectors are also increases. Wireless Sensor Networks (WSN) are gaining the ground in all sectors of life; from homes to factories, from traffic control to environmental monitoring. The air pollution monitoring system contains sensors to monitor the interested pollution parameter in environment. They simulated the three air pollutants gases including carbon monoxide, carbon dioxide &sulphur dioxide in air because these gases decide the degree of pollution level. They also applied the approach in various applications like leaking cooking gas in our homes, to alert the workers in oil & gas industry to detect the leakage etc.

This simulation creates the awareness in people in cities. Due to recent technological advances, the construction material for small and low cost sensors became technically and economically feasible. Even though, Industrialization increase the degree of automation and at the same time it increases the air pollution by releasing the unwanted gases in environment especially in industrial areas like Visakhapatnam.

To implement the project, they selected four areas to deploy the application in Visakhapatnam. To detect percentage of pollution, we used the array of sensor to measure gas quantity in the physical environment in surrounding the sensor and convert them into an electrical signal for processing. Such a signal reveals some properties about interested gas molecule. A huge number of these sensors nodes can be networked in many applications that require unattended operations create a wireless sensor network. Wireless sensors are devices that range in size from a piece of glitter to a deck of cards. Integration of various components creates the air pollution monitoring system.

They are functionally composed of: A Sensing unit that is designed and programmed to sense gas pollutants in air in four busy areas in Visakhapatnam. Some common examples of properties or parameters that are monitored are light, temperature, humidity, pressure, etc. a converter that transforms the sensed signal from an analog to a digital signal; A Processing Unit in Micro controller, process the signals sensed form sensor with help of embedded memory, operating system and associated circuitry. A Radio component that can communicate the sink node or ZigBee router which collects the sensed pollution gas level from sensor node and forwards to pollution server which is in our campus. Powering these components is typically one or two small batteries. The sensors self-organize themselves in a radio network using a routing algorithm, monitor the area for measure the gas levels in air, and transmit the data to a central node, sometimes called a pollution server or base station (interfaced with coordinator), or sink node (interfaced with router), that collects the data from all of the sensors.

The main aim of this paper was to design and implement an efficient monitoring system through which the required parameters are monitored remotely using internet and the data gathered from the sensors are stored in the cloud and to project the estimated trend on the web browser. A solution for monitoring the noise and CO levels i.e., any parameter value crossing its threshold value ranges, for example CO levels in air in an area exceeding the normal levels etc., in the environment using wireless embedded computing system is proposed in this paper. The solution also provides an intelligent remote monitoring for an area of interest. In this paper, we also present a trending results of collected or sensed data with respect to the normal or specified ranges of parameters.

The embedded system is an integration of sensor devices, wireless communication which enables the user to remotely access the various parameters and store the data in cloud. –This work mainly aims to design and develop reliable, efficient, flexible, economical, real-time and realistic wellness sensor networks for smart home systems. The sensor and actuator nodes based on wireless networking technologies are deployed into the home environment. These nodes generate real-time data related to the object usage and movement inside the home. Further extends the smart home system to smart buildings and models the design issues related to the smart building environment. Some of the research works carried out for pollution monitoring system in wide area for making the smart environment, different techniques and algorithms used are discussed in this paper. Architectures, applications, and related design issues are discussed. In this work, they highlight how smart environments represent the trend towards increasing automated environmental monitoring with association of the wireless sensing devices to environmental events and phenomena.

The environmental behaviors are collected actively as a streaming database to identify the environmental conditions and efficient decision making, dissemination by sensors is provided. A secure access standard and an intelligent remote protocol is delivered which is essential for operating, managing, reprogramming, and configuring the wireless sensor devices, for monitoring the remote or hostile environments using environmental monitoring systems installed for independent operation. A unified

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access with respect to the context model and adaptive applications are developed, along with this the executable models is discussed with its state at runtime. A seamless interaction model is developed for user interface adaption and reconfiguration to build context-adaptive applications over a test bed. A layered architecture of sensors and context models is proposed to support context modelling in different phases of development. Towards a Green Campus with the Internet of Things – the Application of Lab Management adopts the concept of "Internet of Things" and provides the idea of energy-saving by properly managing the computers and air conditioners. The architecture of a green campus and the prototype of the system are demonstrated here the computers and air conditioners are objects of interest. ZigBee device and RFID with temperature module are used to develop along with the wireless sensor network.

The objective is to design and develop efficient, economical, flexible, realistic and real-time wellness sensor networks. The sensor and actuator nodes are deployed depending on the wireless networking technologies and generate real-time data that is related to the movements of the object and its usage inside the home. The ZigBee based Digi XBee Series 2 is picked up as RF module for monitoring the system. Further the extension from smart home system to smart buildings along with reliability and system performance are demonstrated. Learning Activity Models for Multiple Agents in a Smart Space for modelling and automating resident activity in multiple-resident intelligent environments, using passive sensors to identify the individuals and their activities in an intelligent environment is presented.

IV. EXISTING SYSTEM MODEL

In today's world many pollution monitoring systems are designed by considering different environmental parameters. Existing system model is presented in figure.1 uses Zigbee based wireless sensor networks to monitor physical and environmental conditions with thousands of application in different fields. The sensor nodes directly communicated with the moving nodes deployed on the object of interest which avoided the use of complex routing algorithm but local computations are very minimal.

RFID is a means of storing and retrieving data through electromagnetic transmission to an RF compatible integrated circuit. It is basically used to track and label items in supermarkets and manufactories. There are two main components of RFID systems: tags and readers. A tag has an unique identification (ID) number and a memory which is used to store additional data such as manufacturer, product type, and environmental factors such as temperature, humidity, etc.

Through Wireless Communication the reader is capable to write and/or read data to tags., In need of identification or tracking, tags are embedded or attached into objects in a typical RFID application. RFID tags can be classified into three major categories by their power source: active tags, passive tags, and semi passive (semi-active) tags are embedded or attached into objects in a typical RFID application.

Mobile phones or smart phones those are cap abled and in built with sensors are applicable for impact on social including how technology of mobile has to be used for to protect environmental, sensing and to influence just-in-time information to create movements and actions ecofriendly. Mobile phone sensors were deployed and used on urban areas for monitoring and it was categorized into two major classes, participatory sensing where user is directly involved and opportunistic sensing where user is not involved, but its limitation includes power and static information processing or mobility restrictions. A Wireless Sensor Network inbuilt of many wireless sensors those are inexpensive, which are able to collect, store, process an environmental information, and to communicate with nodes those are neighbors to each other. Previously, sensors are connected by wire lines.

The access method of WSN gateway node is convenient because data can be received from a WSN via the gateway at any time and any place. In charge of node authentication, message buffering, the gateway works as the network coordinator where you can collect, process, analyze, and present your measurement data. Wireless sensor network management model consists of end device, router, gateway node and management monitoring center. To collect wireless sensor network data, and to forward them to parent node, hence end device is trustworthy then data are forward to gateway node from parent node directly or with the help of router. Gateway node extracts data after getting data from wireless sensor network, then analyzes and packaged them into Ethernet server.

A server is an occurrence of a computer program that is used to accept then reply to another program request; called as a client. So we could say that to run the server software any device could be considered a server.

V. PROPOSED SYSTEM

Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in an area through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data. Also, system keeps measuring sound level and reports it. The sensors interact with raspberry pi which processes this data and transmits it over the application.

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This allows authorities to monitor air pollution in different areas and act against it. Also, authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas. Network Devices and the Internet of Things All kinds of ordinary household gadgets can be modified to work in an IoT system. Wi-Fi network adapters, motion sensors, cameras, microphones and other instrumentation can be embedded in these devices to enable them for work in the Internet of Things.

1. System Block Diagram:

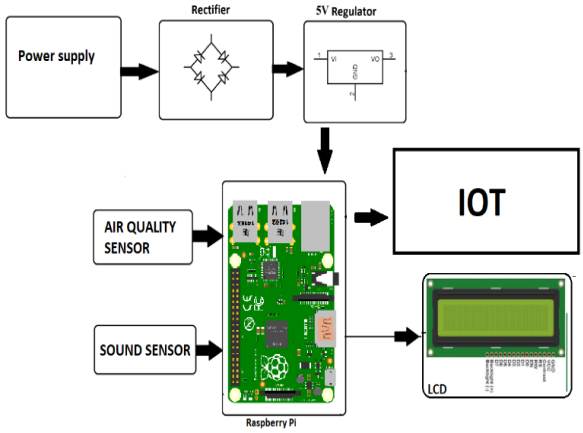

Fig 1. Block Diagram.

2. Advantages:

- Sensors are easily available.
- Interface any number of sensors to know detail content of all gases present in air.
- Detecting a wide range of gases, including CO, MH4, alcohol, smoke etc.
- Simple, compact & Easy to handle.
- Sensors have long life time & less cost.
- Simple Drive circuit.
- System is Real time.
- Operating voltage : 5 volt,-20°C to +50°C

3. Applications:

- Roadside pollution Monitoring.
- Industrial Perimeter Monitoring.
- Site selection for reference monitoring stations.
- Indoor Air Quality Monitoring.
- Design server using IoT and upload data on that server with date and time.
- To make this data available to the common man.
- To set a danger limit on that server and inform authorities to take future actions for wellbeing.

VI. RESULT

The air and sound pollution monitoring system monitors air and noise pollution using a mobile application. It shows the digital value of air and sound pollution and user can analyze it with a graph. It becomes very easy for us to rectify the levels and air and noise pollution around and plan for a healthy living and surrounding. The figures that are included in our paper shows the way the system works and how the output is obtained from the input after processing.

VII. CONCLUSION

The Automatic Air & Sound management system is a step forward to contribute a solution to the biggest threat. The air & sound monitoring system overcomes the problem of the highly-polluted areas which is a major issue. It supports the new technology and effectively supports the healthy life concept. This system has features for the people to monitor the amount of pollution on their mobile phones using the application. So, it becomes very reliable and efficient for the Municipal officials along with the Civilians to monitor environment.Letting civilians also involved in this process adds an extra value to it. As civilians are now equally aware and curious about their environment, this concept of IOT is beneficial for the welfare of the society. And it is implemented using the latest technology.

REFERENCES

[1] Navreetinder Kaur, Rita Mahajan, Deepak Bagai,“Air Quality Monitoring System based on Arduino Microcontroller,” International Journal Innovative Research in Science, Engineering and Technology (IJIRSET),Vol 5, Issue 6- June 2016.

[2] Shadrach Tunde, Akinkaude, kowawole, Peter Fasae, “A Survey of Noise Pollution in Ado-Ekiti Metropolis Using Mobile Phone,” Science Technology Department, Science Research Publishing, October-2015.

[3] Diego Méndez, Alfredo J. Pérez, Miguel A. Labrador, Juan José Marrón, "P-Sense: A participatory sensing system for air pollution monitoring and control" (Department of Computer Science and Engineering, University of South Florida, Tampa, USA) Published on IEEE at: 12 May 2011, DOI: 10.1109/ PERCO MW.2011.5766902.

[4] JiongJin, JayavardhanaGubbi, SlavenMarusic, MarimuthuPalaniswami, "An Information Framework for Creating a Smart City Through Internet of Things,"Published in: IEEE Internet of Things Journal (Volume:1, Issue:2, April (2014) DOI:10.1109/ JIOT.2013.22965168.

[5] A. R. Al-Ali, Imran Zualkernan, and FadiAloul, “A Mobile GPRS-Sensors Array for Air Pollution Monitoring,” IEEE SENSORS JOURNAL, VOL. 10, NO. 10, OCTOBER 2010.

[6] Hsing-I Wang Lin Tuing, “Toward a Green Campus with the Internet of Things – the Application of Lab

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Management," Proceedings of the WorldCongress on Engineering 2013 Vol II, WCE 2013, July 3 - 5, 2013, London, U.K.

[7] Darshana N. Tambe, Netika A. Chavhan, "Evaluation Air Pollution Parameters Using Zigbee (IEEE 802.15.6),"IOSR Journal of ComputerEngineering; Vol 11, Issue 4 - May-June 2013.

[8] AnjaiahGuthi,"Implementation of an Efficient Noise and Air Pollution Monitoring System Using Internet of Things," International Journal of Advanced Research in Computer and Communication Engineering, Vol 5, Issue 7- Jully 2016.

[9] Dr. A. Sumithra, PJ.Jane Ida, PK. Karthika, Dr. S. Gavaskar,"A smart environmental monitoring system using internet of things," Members,IEEE Vol 3,Issue 3-Oct 2013.

[10] P.Vijnatha Raju, R.V.R.S.Aravind, Sangeeth Kumar, "Pollution Monitoring System using Wireless Sensor Network,"International Journal ofEngineering Trends and Technology (IJETT), Vol 4, Issue 4- April 2013.

[11] A. R. Al-Ali, Imran Zualkernan and FadiAloul, ―A Mobile GPRS-Sensors Array for Air Pollution Monitoring‖ IEEE SENSORS JOURNAL,VOL. 10, NO. 10, OCTOBER 2010

[12] F. Tsow, E Forzani, A. Rai, R. Wang, R. Tsui, S. Mastroianni, C. Knobbe, A. J. Gandolfi, and N. J. Tao, ―A wearable and wireless sensor system for real-time monitoring of toxic environmental volatile organic compounds, IEEE Sensors J., vol. 9, pp. 1734–1740, Dec. 2009.

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